Remarks

Claims 1, 3, 5-7, 9-17, 19, 21-23, and 25-32 were pending prior to this amendment and stand rejected. Claims 1, 3, 5-6, 9-17, 19, 21-22, 25-32 are amended by this amendment. New claims 33-38 are added by this amendment. Applicant respectfully requests allowance of claims 1, 3, 5-7, 9-17, 19, 21-23, and 25-38.

The first Office Action indicated that claims 8-11 and 24-27 contained allowable subject matter. In the first amendment, Applicant amended and cancelled claims for the purpose of expediting the issuance of the allowable subject matter, and the Applicant planned to pursue the cancelled subject matter in a continuation application. In the second Office Action, the allowability of claims 8-11 and 24-27 was withdrawn. As a result, Applicant has removed the limitations added in the first amendment and added new claims. No estoppel should arise due to the first amendment.

Claims 1, 3, 5-7, 9-17, 19, 21-23, and 25-32 stand rejected under 35 U.S.C. §103(a) over U.S. Patent Application Publication 2003/0109951 (Hsiung) in view of U.S. Patent 6,780,306 (Schlager). Applicants have amended the claims to distinguish Hsiung in view of Schlager.

Claim 1 requires, "processing the sensor signals to determine a deviation between the sensor data and a baseline for the process .... comparing the deviation to a threshold and generating a trigger if the deviation exceeds the threshold .... generating a process vector representing the deviation .... and ... in response to the trigger, comparing the process vector to a plurality of library vectors representing abnormal operating conditions to classify the deviation."

The method requires classifying the deviation *in response to a trigger* that is generated if the deviation exceeds a threshold. The method does not generate the trigger if the deviation does not exceed the threshold, and without the trigger, the library comparison is not performed to classify the deviation. Thus, the method more efficiently uses processing capacity by avoiding the classification step for small deviations that do not exceed the threshold. In contrast, Hsiung appears to always invoke a set of algorithms and models to produce a descriptor that characterizes process operations. (See Hsiung, paragraphs 89-100, 114-127, and 129-147). ***Hsiung does not teach the use of a trigger.***

The method requires a *process vector that represents a deviation* between the sensor data and the baseline. In contrast, Hsiung processes the *sensor data itself* to characterize process operations. The sensor data itself is *not a deviation* between the sensor data and a baseline. Hsiung uses a baseline correction process to clean up the sensor data, find response peaks, etc., but Hsiung does not teach any *vector representation of these deviations* (See Hsiung, paragraphs 57-58, 133, 162, and 182). ***Hsiung does not teach the use of a vector representation of a deviation between sensor data and the baseline.***

The method requires that a process vector representing a *deviation be compared to library vectors representing abnormal operating conditions to classify the deviation.* Hsiung teaches processing a vector representation of the sensor data itself with various models and algorithms, but Hsiung does not teach the specifics of comparing a vector representation of the *deviation* with a *library of vectors* that represent abnormal operating conditions to classify the deviation. (See Hsiung, paragraphs 59-73 and 143-147). ***Hsiung does not compare a vector representation of the deviation to a library of vectors that represent abnormal operating conditions to classify the deviation.***

Schlager does not provide the above teachings that are missing from Hsiung. The above remarks also apply to claim 17. Thus, claims 1 and 17 are patentable over Hsiung and Schlager.

Claims 5 and 21 require signaling a control system to operate a valve in response to classifying the deviation as a contaminant in water. The Examiner cites paragraph 109 of Hsiung as providing this teaching. The paragraph only states that the product descriptor may be used to initiate the order of a pump, but the paragraph does not mention any teachings on water contamination or valve control.

Claims 6 and 22 require signaling a control system to add a marker to water in response to classifying the deviation as a contaminant in the water. The Examiner cites paragraph 111 of Hsiung as providing this teaching. The paragraph talks generally about predicting and controlling process behavior, but the paragraph does not mention any teachings on water contamination or adding a marker.

Claims 7 and 23 require signaling a control system to add a colorant to water in response to classifying the deviation as a contaminant in the water. The Examiner cites paragraph 343 of Hsiung as providing this teaching. The paragraph talks about adding a

dye to breakfast cereal, but the paragraph does not mention any teachings on water contamination or adding a colorant marker.

Claims 12 and 28 require processing the sensor signals to produce a single variable and comparing the single variable to the threshold. The Examiner cites paragraphs 192, and 359-364 of Hsiung as providing this teaching. The paragraphs talk about medical uses and sensor displays, but the paragraphs do not mention any teachings on single variables and thresholds.

Claims 13 and 29 require that the process vector *representing the deviation* be a unit vector. As discussed above, Hsiung does not teach any vector representation of the *deviations*. The Examiner cites paragraphs 134-141 of Hsiung as providing this teaching. The paragraphs talk about a vector representation of the sensor data itself, but not a vector representing the *deviation* between the sensor data and a baseline.

Claims 14 and 30 require comparing *an angle* between the process vector and one of the library vectors to a threshold. The Examiner cites paragraphs 488-489 of Hsiung as providing this teaching. The paragraphs talk about sensor modeling, but do not mention vector *angle* comparisons.

Claims 15 and 31 require identifying one of the abnormal operating conditions represented by one of the library vectors that matches the process vector. The Examiner cites paragraphs 483-486 and 500 of Hsiung as providing this teaching. The paragraphs talk about sensor modeling and sensor failure detection, but do not mention vectors that are associated with abnormal operating conditions.

Claims 16 and 32 require storing the process vector as a new one of the library vectors and associating a new abnormal operating condition with the new library vector in response to an unknown classification. The Examiner cites paragraphs 483-486 and 500 of Hsiung as providing this teaching. The paragraphs talk about sensor modeling and sensor failure detection, but do not mention supplementing the vector library based on unknown classifications.

Applicants submit that there are numerous additional reasons in support of patentability, but that such reasons are moot in light of the above remarks and are omitted in the interests of brevity. Applicant respectfully requests allowance of claims 1, 3, 5-7, 9-17, 19, 21-23, and 25-38.

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